

ROYAL BOTANIC GARDENS, KEW.

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OF

MISCELLANEOUS INFORMATION.

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XXI.—A REVISION OF CANAVALIA.

C. V. PIPER and S. T. DUNN.

Early in 1920 Mr. C. V. Piper, whose work on the two Canavalias, the Jack Bean and the Sword Bean, is well known, asked for the assistance of Kew in clearing up one or two points of confused nomenclature in the genus as well as in a revision of the whole of *Canavalia*. Sir David Prain allowed Mr. S. T. Dunn (Assistant for India at Kew), to co-operate with Mr. Piper in this matter. The joint revision was to be published in America. This, however, has not proved convenient and at Mr. Piper's request the Director has agreed to publish in the *Kew Bulletin* the part concerning the Old World species. The second part dealing with the Canavalias of the New World will appear later in an American periodical.

Canavalia, *Adans. Fam.* 325 (Canavali); *DC. Mem. Leg.* 375; *Benth. in Benth. & Hook. f. Gen. Pl. i.* 537. *Descr. Benth. addenda.* Calyx tubuloso-campanulatus. Vexillum basi bicallosum; stylus imberbis vel raro apice hirtellus. Legumen nonnunquam endocarpio papyraceo separabili.

Species circiter 50 in regionibus calidioribus utriusque orbis crescentes.

CANAVALIAS OF THE OLD WORLD.

Early botanical history. The first botanist to publish descriptions and figures of these plants was Rheede, who, in 1688, included in his *Hortus Malabaricus* the three species that grow on the coast of Malabar. He described the cultivated *C. gladiata* under the name *Bara-mareca* (*Hort. Malabar.* viii. t. 44), the sea-shore *C. podocarpa* as *Catu tsjandi* (t. 43) and the large-podded *C. turgida* as *Catu-baramareca* (t. 45). Nearly half a century later Kaempfer (*Amoen.* 836) alluded to *C. gladiata* as cultivated in Japan under the name of *Natta mame*. In 1747 Rumphius wrote his *Herbarium Amboinense* and with very indifferent figures and descriptions referred to *C. rosea*

under the name of *Cacara litorea* (t. 141), *C. gladiata* as *Lobus machaeroides* (t. 135). *C. turgida* which occurs in Amboina but was not apparently figured by Rumphius was identified by Merrill with t. 141. In 1784 Thunberg published his *Flora Japonica* in which *C. lineata*, the only wild species in the islands is recognised under the name of *Dolichos lineatus* (p. 280) as growing on the sea-shore round Nagasaki, while the cultivated *Natta mame*, appears as *Dolichos ensiformis* (p. 279).

It was now 50 years before any further additions were made to the genus by workers in the field. But meanwhile the group had been recognised as distinct from *Dolichos* by Adanson in 1763 (*Adans. Fam.* ii. 325) and established as *Canavali*, enumerating most of the characters now relied on to distinguish it from neighbouring genera. Under a Latinised form, *Canavalia*, Aug. De Candolle collected all the species known in 1825 (*Prodr.* ii. 404) and defined Adanson's genus with greater accuracy (*Mem. Leg.* 375). It was about this time that various botanical writers, endeavouring to reconcile the figures, descriptions and vernacular names of previous workers, which of course could not be clearly done without specimens, caused a complicated synonymy. The chief confusion was caused by De Candolle himself by the designation of the Malabar sea-shore plant as *C. obtusifolia*. And it is largely this mistake and its prolific progeny which has impelled us to undertake a critical review of the whole subject and to offer in the following pages our final conclusions on the question of the nomenclature of the species. It is not necessary to lay stress on the progressive stages of the confusion. It may be clearly traced in our synonymy of each of the older species.

In 1832 Roxburgh (*Fl. Ind.* iii. 300) enumerated all the species known to him under *Dolichos*, though two of the maritime forms are probably included under the name of *D. rotundifolius*, Vahl under a misapprehension as to the true meaning of Vahl's name. Two years later Wight and Arnott (*Prodr.* ii. 253) correctly described the S. Indian species under *Canavalia*, but in endeavouring to adjust the synonymy introduced the prolific source of confusion centring on the inclusion of Lamarek's name of *Dolichos obtusifolius* as a synonym of the sea-shore species.

Distribution.—The most widely distributed member of the genus is *C. rosea*, which encircles the globe, abounding on the hot, sandy shores of the tropics and seldom found beyond them. Away from the sea it is represented in the interior of Africa by *C. regalis* towards the north and by *C. ferruginea* in the south. Another allied species *C. plagiosperma* has been described as a cultivated plant probably from Mauritius. Just north of the range of *C. rosea* on the China coast we find its near ally *C. obcordata*, in the S. Pacific on the very south of its range it is represented by the closely allied *C. Baueriana* in Norfolk Island, while in India and Ceylon it is replaced by *C. podocarpa*.

C. virosa extends from the south of Asia to the East of Africa and is continued beyond this range as far as the Pacific by the allied *C. lineata* from Japan to Formosa and by *C. luzonica*, a little further to the south in the Philippine Islands. On the other extremity of its range *C. africana* replaces it as far as the Atlantic.



Canavalias of the Old World.

C. turgida is distinguished from all the other species as Prain pointed out, by its separable endocarp. This integument closely invests the seeds and possibly aids in their dispersal in a living state by sea-currents. Its range is a large one reaching from Hawaii to the Mascarene Islands and including India, the Malay Islands and New Guinea, in all of which it is found climbing on the bushes that fringe the sea-shore.

The two remaining species *C. galeata* and *C. sericea* inhabit Polynesia, the first to the north and the second to the south of the equator. Their peculiar floral characteristics unite them into a group by themselves.

Fertilisation.—Every mature flower that has been examined in Old World material presents the following general characters:—The blade of the standard is expanded in a vertical plane, the claw being held with those of the other petals in a horizontal

position by the tubular calyx. The rectangular bend of the standard necessitated to secure these relative positions occurs just at the end of the blade. The four lower petals project horizontally past this point, concealing the staminal sheath, and the ovary, style and stigma which it contains. At the point where the base of the wing- and keel-petal blades leave the standard owing to its upward bend there are two prominent ear-shaped callosities close together at the middle of the base of the standard blade. These hold between them the upper edges of the lower petals just as the fingers and thumb may hold together the pages of a book. A weight such as that of an insect alighting on the lower petals will depress them and so liberate them from the callosities which hold them together. They are thus enabled to open and to slide down on each side of the stiff genital core. This brings the under side of the insect on to the brush of stamens or if the staminal sheath has split (which it does after the pollen is used), on to the exposed stigma. After each insect-visit, the petals, according to a field note by Mr. Keith on a sheet of *Canavalia* from Siam in the Singapore Herbarium, rise again, protecting the genitalia. The correct position of the insect is presumably encouraged by the offer of nectar round the disc which can only be reached through the slits in the upper side of the base of the staminal sheath. The position of the flower is not, however, always standard upwards as indicated above. Mr. I. H. Burkill records observations made by him on the fertilisation of *Canavalia rosea* as follows:—“The flowers commonly upside down, but sometimes face upwards. *Xylocopa aestuans* was visiting and in either case stood on the standard and caused the stamens to dust the back of its thorax as it does in *Eriosema*.” But in each case the deposit of pollen occurs of course on a different surface of the visiting insect.

Our thanks are due to the Director of the Royal Botanic Gardens, Kew, and to the Keeper, Botanical Department, Natural History Museum, London, for leave to use the material in the establishments under their charge, to the Director of the Singapore Botanic Gardens for the loan of all the *Canavalia* sheets in the Singapore Herbarium, and to Mr. H. N. Ridley for notes and for a collection of specimens specially made for us on a recent visit to the Malay Peninsula.

KEY TO THE OLD WORLD CANAVALIAS.

- | | | | | | | |
|---|---|---|---|---|---|----|
| 1. Pod with two supplementary ribs close to the upper suture | - | - | - | - | - | 2 |
| Pod with two supplementary ribs 5 mm. or more distant from the upper suture | - | - | - | - | - | 13 |
| 2. Upper lip of calyx equal to the tube; flowers 4 cm. long (Polynesian plants) | - | - | - | - | - | 3 |
| Upper lip of calyx shorter than the tube | - | - | - | - | - | 4 |

3. Leaves glabrous - - - 1. *galeata*.
Leaves silky - - - 2. *sericea*.
4. Pod 20 times longer than broad; seeds white; hilum $\frac{1}{10}$ circum. of the seed - - 3. *ensiformis*.
Pod 2-6 times longer than broad; seeds red, brown or white; hilum $\frac{1}{6}$ to $\frac{1}{3}$ circumference of seed - 5
5. Strongly climbing plants with hilum $\frac{1}{6}$ - $\frac{1}{3}$ circumference of seed - - - 6
Creeping plants with hilum $\frac{1}{6}$ circumference of seed - 11
6. Pod 4-5 cm. broad; hilum $\frac{1}{6}$ - $\frac{1}{3}$ circumference of seed 7
Pod 1.3-3 cm. broad; hilum $\frac{1}{3}$ circumference of seed 8
7. Seed red, white or brown with hilum $\frac{1}{3}$ of circumference of seed - - - 4. *gladiata*.
Seed crimson with hilum $\frac{1}{6}$ of circumference of seed 5. *regalis*.
8. Ripe pod-valves dull brown, woody, convex, six times as long as broad - - - 9
Ripe pod-valves coriaceous, flat, yellow - - 10
9. Ripe pods about 3 cm. wide (African plants) 6. *africana*.
Ripe pods about 2 cm. wide (Philippine plants) 7. *luzonica*.
10. Pods, long, parallel-sided - - - 8. *virosa*.
Pods short, semi-elliptic - - - 9. *lineata*.
11. Pod-valves firm and flat when mature - - 12
Pod-valves thinly leathery and turgid when mature 10. *obcordata*.
12. Pods gradually acuminate at the base 11. *podocarpa*.
Pods abruptly acuminate at the base - 12. *rosea*.
13. Pods about twice as long as broad; endocarp separating 13. *turgida*.
Pod about 6 times as long as broad; endocarp adherent to valves - - - 14
14. Plant pubescent - - - 15
Plant glabrous - - - 14. *Baueriana*.
15. Calyx densely ferrugineous - - - 15. *ferruginea*.
Calyx strigillose - - - 16. *plagiosperma*.

1. *C. galeata*, Gaud. in Freyc. Bot. Voy. Uranie (1825) 486 (adnot.); Hillebr. Fl. Hawaii (1888) 102; Rock, Legum. Pl. Hawaii (1920) 209. *C. Gaudichaudii*, Endl. in Ann. Wien Mus. i. 186 (1836). *Dolichos galeatus*, Gaud. l.c. 486 t. 115. *C. pubescens*, Hook. & Arn. Bot. Beechey Voy. 81 (1841). *C. galeata*, Gaud. var. *pubescens*, A. Gray in U.S. Expl. Exped. (1854) 441; Rock, l.c. 211 t. 86.

The pubescent state cannot be separated from the type by its leaves and flowers; the pods are not described and have not been seen by the writers.

SANDWICH ISLANDS. Douglas 6; Hildebrand; Hinds.

2. *C. sericea*, A. Gray l.c. 440. Rock. l. c. 287 t. 85.

SOCIETY ISLANDS. Anno 1769, Banks and Solander.

FIJI ISLANDS. Herb. U.S. Expl. Exped.

FRIENDLY ISLANDS. W. H. Harvey.

COOK ISLANDS. Rorotonga, T. E. Cheeseman.

3. *C. ensiformis*, DC. Cultivated in various parts of the Old World. Native of the West Indies.

4. *C. gladiata*, DC., Prodr. ii. 404 (1825); Piper, Circ. 110, Bur. Pl. Industr. U.S.A. Dept. Agric. (1913) 34. *C. incurva*, Thou. in Desv. Journ. Bot. ii (1843) 80; Hiern. Cat. Welw. Afr. Pl. i. (1896) 254 (non DC.). *C. ensiformis*, Baker in Oliv. Fl. Trop. Afr. ii. (1871) 190; Baker in Hook. f. Fl. Brit. Ind. ii (1879) 62; Prain in Journ. As. Soc. Beng. lxvi. (1897) 62; Prain Beng. Pl. i. (1903) 394; Cook, Fl. Bomb. i. (1903) 372; Gamble Fl. Madr. ii. (1918) 359; Gagnep. in Lecomte, Fl. Indo-Chine ii. (1916) 260; Chev. in Expl. Bot. Afr. Occ. Fr. (1920) 196 (non DC.); *C. maxima*, Thou. l.c. *Dolichos gladiatus*, Jacq. Ic. Rar. t. 560 (1785-1793); Roxb. Fl. Ind. iii. (1832) 300. *Baramareca*, Rheede, Hort. Malabar. viii. t. 44 (1688). *Natta Mame*, Kaempf. Amoen. 836 (1712)? *Lobus machaeroides*, Rumph. Herb. Amboin. v. t. 135 f. 1 (1747).

INDIA. Bengal, C. B. Clarke 13809; Sylhet, C. B. Clarke 17395A; Soane River, J. D. Hooker; Assam, Jenkins 22; N. Cachar Hills, Craib; Kuala Lumpur, Yapp 256 (Cult.).

PHILIPPINE ISLANDS. Cult. Manila, Bur. of Sci. 5167.

TROPICAL AFRICA. Loanda, Welwitsch.

The Sword Bean, as far as is known, does not occur in a truly wild state but it is widely cultivated by the natives of India and other tropical countries and runs wild everywhere. In the naturalized condition it has smaller pods but it can always be distinguished by its acuminate leaflets and the length of the hilum of its seeds. Messrs. Thomstone and Sawyer in their account of the Peas and Beans of Burma (*Bull.* No. 12 of 1914 of the *Dept. of Agric. Burma*), classify the well known forms of the species according to the colour of their flowers and seeds. But Var. 2 which has smaller and narrower pods is possibly another species (*C. virosa*, W. & A.). The Sword Bean might well be considered as derived originally from *C. virosa*, W. & A., an inland climber extending from W. Africa to the Philippines. When found as an escape from cultivation it is not easily distinguished from that species.

5. *C. regalis*, Dunn, sp. nov., affinis *C. gladiatae*, DC., sed seminibus majoribus hiloque brevior differt.

Herba perennis, scandens, 4-5 m. alta, primo pubescens, tandem calycibus exceptis glaberrima. *Folia* pinnatim trifoliolata; petioli foliis breviores, sulcati; petioluli 1-1.5 cm. longi; stipulae et stipellae parvae, caducae; foliola ovata, apice acuta, basi obtusa, abrupte acuminata vel acuta, membranacea, lateralia paullo obliqua, 10-20 cm. longa. *Racemi* 10-14-flori; pedunculi racemis subaequales, foliis vix breviores; pedicelli e

nodis 2-3-ni, calyce breviores. *Flores* albi, fragrantés. *Calyx* campanulatus, 1.5 cm. longus; labium superius tubo paullo brevius, emarginatum, erectum; inferius dimidio brevius 3-lobatum, lobis ovatis cordatis acuminatis medio exterioré, lateralibus obliquis labio superiori exterioribus. *Petala* 2-3 cm. longa. *Vexillum* late ovatum, emarginatum, basi in unguem lamina brevioré abrupte angustatum, medio callis 2 ornatum, qui cum laminae auriculis calcara petalorum aliorum tenent. *Alae* oblongae, obtusae, sub-falcatae, basi semisagittatae. *Carina* curvata. *Stamina* 10, sub anthesi monadelpha, tubo versus basin staminis vexillaris utrinque hianté. *Discus* circum basem ovarii breviter cylindricus. *Ovarium* pubescens, breviter stipitatum; stigma capitatum. *Legumen* oblongo-lineare, 20-30 cm. longum, 3.5-4.5 cm. latum, 2-2.5 cm. crassum, costis duobus 4 mm. altis a sutura superiore 5 mm. utrinque distantibus, sutura inferioré nonnunquam valde intrusa. *Semina* 10-12, 2.5-3 cm. longa, 1.5-2 cm. lata, 1.25 cm. crassa, coccinea; hilum 1.2 cm. longum.

TROPICAL AFRICA. Nigeria; Nupe, *Barter* 1607; Jeba, on the Kworra, *Barter*; Sudan; S. Kordofan, Jebel Eliri, *Mr. & Mrs. A. F. Broun* 1375; Jebel Eliri (Nuba Hills) name *Tambui*. "The seeds are strung as bracelets in the Bahr-el-Ghazal to bring luck when shooting."

6. *C. africana*, *Dunn*, sp. nov., affinis *C. virosae*, W. & A., sed legumine lignoso tumido differt.

Herba perennis, scandens, mox omnino glabra. *Folia* pinnatim trifoliolata; petioli foliolis breviores; petioluli 5 mm. longi; stipulae et stipellae caducae; foliola ovata, apice breviter acuminata, basi truncata vel obtusa, 10-17 cm. longa, membranacea; lateralía vix obliqua. *Racemi* 20-40-flori; pedunculi racemis bis vel ter longiores, foliis aequales; pedicelli e nodis 2-3. *Flores* purpurei. *Calyx* campanulatus, chartaceus, 15 mm. longus; labium inferius superiore bis brevius; lobi ovati, obtusi. *Petala* rubella, 3 cm. longa. *Vexillum* late ovatum, apice truncatum, emarginatum, basi laminae truncatum, abrupte inflexum et in unguem angustatum, eoque appendicibus duabus auriformibus contiguis notatum et auriculis membranaceis eodem ornatum. *Alae* angustae, ovato-lanceolatae, supra unguem inflexae. *Stamina* basi excepta monadelpha. *Discus* cylindricus, brevis. *Ovarium* pubescens; stylus glaber; stigma capitatum. *Legumen* maturum lineari-oblongum, apice basique obtusum; 30-50 cm. longum; valvae lignosae, brunneae, turgidae, costis prope suturam superiorem notatae. *Semina* 6-8, ovalia, 1.8 × 0.2 × 0.8 cm.; hilum 1.5 cm. longum circiter ter circulo seminis superatum.

TROPICAL AFRICA. Nile bank; Uchopeh, *Speke* and *Grant* 628. Lagos; Oloke Meji, *Foster* 129; Poloula *MacGregor* 177. Nigeria; Mongu, 1320 m., used for rattles (Hausa *Borran*); Kashi, *Lely* 387. Angola; *Gossweiler* 5626.

7. *C. luzonica*, Piper in Biol. Soc. Wash. xxx. 177 (1917).
C. ensiformis, Merrill in Philipp. Journ. Sci. v. 125 (non DC.).

PHILIPPINE ISLANDS. Luzon; Lamao River, Merrill 3172, 3811; Loher 2293, 2295; Lubang, Merrill 963; Bataan, Elmer 6870.

8. *C. virosa*, Wight & Arnott, Prodr. ii. (1834) 253: Gamble l.c. 359. *C. polystachios*, Schweinf. Rel. Kotsch. (1868) 25. *C. ensiformis*, var. *virosa*, Baker in Hook. f. Fl. Brit. Ind. ii. 196; Prain Beng. Pl. i. (1903) 394. *C. ensiformis* var. *mollis*, Baker l.c. *C. ensiformis* var. *mucunoides*, Baill. in Bull. Soc. Linn. Par. i. 384 (1883). *C. mollis*, Wight & Arnott l.c. *Dolichos polystachios*, Forskal Fl. Aegypt. (1775) 134 (non Linn.) *D. virosus* Roxb. l.c. 301.

CHINA. Yunnan; Szemao, Henry 12424.

INDIA. Madras Pres., Roxburgh; Penins. Ind. Or. Wight 736; Nopoly, Wallich 5531D, E; Palamcottah and Sirumalais, Wight 750; Maisor & Carnatic, G. Thomson; Madras, Bourne; Sirumalais, Bourne 882; Godavari District, Bourne 3222, 3371; Chingleput Dist., Madras, Bourne 11186; Kodaikanal, Pulney Hills, Sauliere 587; Bombay Pres. Konkan, Edgeworth; Stocks; Belgaum Jungles, Ritchie 201; N.W. Provinces, Jungle, Banda, Bell 270.

SIAM. Chengmai, Kerr 1532B; Bangkok, Zimmermann 52; Bangtaphan, Keith 321.

TROPICAL AFRICA. Mittu; Uokko, Schweinfurth 2816.

SOCOTRA. Hillsides, Balfour 424.

ARABIA. Yemen, Barbey 1829.

MASCARENE ISLANDS. Madagascar, Baron 1442, 4370; Methuen; Mauritius, Bouton.

In his original description Roxburgh describes the seeds as light grey, but his unpublished figure in the Kew library shows them as mottled brown.

9. *C. lineata*, DC., Prodr., ii. 404. *Dolichos lineatus*, Thunb., Fl. Jap. (1784) 280.

Herba perennis, scandens, glabra, caulibus, striatis. *Folia* pinnatim trifoliolata; petioli foliolis vix breviores, sulcati; petioluli 0.8–1 cm. longi; foliola membranacea, siccitate reticulata, late ovata, obtusa vel obtuse acuminata, basi truncata vel breviter acuminata, 8–14 cm. longa; stipulae stipellaeque minutae, caducae. *Pedunculi* foliis breviores vel rarius multo longiores. *Flores* in racemis saepius quam pedunculi multo brevioribus, ex nodis in paribus 5–6 enati. *Calyx* robustus, striatus; labium superius tubo brevius, emarginatum, erectum; labium inferius dimidium superioris attingens, 3-lobatum; lobi ovati, cordati, medio acuminato, lateralibus oblique acutis. *Petala* aequalia, rubella, calyce bis longiora. *Vexillum* ovatum, reflexum, apice emarginatum, basi truncatum, auriculis 2 mem-

branaceis incurvatis notatum et inter eis bicallosum. *Alae* lineari-oblongae, paullo falcatae, in latere superiore callosae. *Carinae* petala obovato-oblonga, fere recta, basi sagittata. *Discus* brevis. *Ovarium* stipitatum, suturis sericeum, 4-5-ovulatum. *Legumen* semi-ellipticum, compressum, chartaceum, ochraceum, juxta suturam superiorem utrinque costis longitudinali instructum, 6-10 cm. longum, 2.5-3.5 cm. latum, 1 cm. crassum, apice basique obtusum; endocarpium valvis adherens. *Semina* 2-3, ovalia, 1.7 cm. longa, 7 mm. lata, brunnea, maculata; hilum tertiae parti circumscriptionis seminis aequale.

JAPAN. Nagasaki (in rupestribus maritimis 40-pedalis), *Maximowicz* (1863).

JAPAN & KOREAN ARCHIPELAGO. *Oldham* 358.

CHINA. (Fortune?); French Island; Whampoa, *Hance* 5196; Hongkong, *Lamont*; Hainan, *Henry* 8046.

FORMOSA. *Oldham* 176, 177; litore, Tamsui, *Faurie* 152; Apes Hill, Takow, *Henry* 153.

10. *C. obcordata*, *Voigt*, Hort. Suburb. Calc. 235. *Dolichos obcordatus*, Roxb. Fl. Ind. iii. 303; Roxb. Fig. 2327 (unpubl.)

Herba perennis, procumbens, in arena maritima repens, cito glabra, caulibus striatis. *Folia* pinnatim trifoliolata; petioli foliolis breviores, supra sulcati, vix 1 cm. longi; foliola membranacea, late ovata, obtusa, apiculata vel retusa, basi obtusa, 7-10 cm. longa; stipulae e disco calloso basi producto enatae; stipellae lineares, caducae. *Pedunculi* foliis breviores. *Flores* 5-9, e nodis bini, racemos pedunculis breviores formantes. *Calyx* robustus, 1-1.4 cm. longus; labium superius tubo bis brevius, late ovatum, emarginatum; labium inferius dimidium superioris attingens, lobis 3, acuminatis. *Petala* 2.5 cm. longa, splendide rubella. *Vexillum* late ovatum, reflexum, emarginatum, basi truncatum bicallosum. *Alae* oblongae, supra unquam incrassatae. *Carinae* petala ovata, infra rotundata, breviter caudata, supra in rostrum obtusum incurvata. *Ovarium* dense pubescens, basi disco brevi cinctum. *Legumen* lineari-oblongum, apice obtusum, basi acutum, 10-11 cm. longum, 2.5 cm. latum, 7.5 mm. crassum, turgidulum; valvae molliter coriaceae. *Semina* 6-9, ovalia, opace brunnea, 1.2 cm. longa, 7.5 mm. lata et 5 mm. crassa; hilum 6-7 mm. longum, $\frac{1}{3}$ - $\frac{1}{6}$ seminis circumscriptionis.

CHINA. Stanley, Hongkong, *Ford* 636; Lantao Island, *Lamont* 183A; *Tutcher* 652 (Hongkong Bot. Gard. from seed of *Ford* 636); Hongkong, *C. Wright*, 129.

11. *C. podocarpa*, *Dunn*, sp. nov.; *C. obtusifolia*, *Wight* & *Arnott* l.c. 253; *Cleghorn* in *Madr. Journ.* i. 27 (1857) t. 4; *Baker* l.c. 196 (partly); *Trimen*, *Fl. Ceyl.* ii. (1894) 68; *Talbot* *For. Fl. Bombay*, i. (1909) 405 (non DC.); *C. lineata*, *Cook*, *Fl. Bomb.* i. (1906) 373; *Prain*, *Beng. Pl.* i. (1903) 394; *Gamble*,

Fl. Madr. ii. (1918) 359, (non DC.). *Catu-tsjandi*, Rheede l.c. t. 43.

Herba perennis, procumbens, cito glabra. *Folia* pinnatim trifoliolata; petioli foliis paullo longiores, supra vix sulcati; petioluli 5-8 mm. longi; foliola paullo carnosa, obovata vel rotundata, obtusa, apice apiculata, basi obtusa, 2-5 cm. longa; stipulae stipellaeque parvae et caducae. *Pedunculi* foliis saepius multo longiores. *Racemi* 5-7-flori, pedunculis bis breviores. *Flores* 1-2-ni ex nodis enati; pedicelli calyce bis breviores. *Calyx* 1.3-1.5 cm. longus; labium superius tubo bis brevius, emarginatum, erectum; labium inferius 1-2 mm. longum, 3-lobatum, lobis latis obtusis vel breviter acuminatis. *Petala* rubella vel alba. *Vexillum* late ovatum, reflexum, emarginatum, 3.5-4 cm. longum, basi plicatum bicallosum. *Alae* anguste oblongae fere rectae, sagittatae, vexillo breviores. *Carinae* petala arcuata, alis aequilonga. *Ovarium* stipitatum, primo pubescens. *Stylus* glaber. *Stigma* capitatum. *Legumen* lineari-oblongum, rectum, circiter 9 cm. longum, 2 cm. latum, basi in stipitem longum angustatum; valvae maturae flavidae, planae, chartaceae, juxta suturam superiorem utrinque costa forti longitudinali instructum. *Semina* 4-5, ovoidea, compressa, siccitate nigra; hilum $\frac{1}{2}$ circumscriptionis seminis.

INDIA. Madras Presidency; in arena mobile inter Quilon et Anjengo prope mare, *Wallich* 5532B; Quilon, *Wight Cat.* 748, *Wight Herb. propr.* 253; Madras, *Bourne* 2219; Cuddalore sea-shore, *Barber* 716; Ceylon, *Thwaites C.P.* 1484; Cult. in Calcutta Bot. Gard. *Wallich* 5532B.

Common on sandy sea shores in the south of the Indian peninsula and Ceylon and referred to by Cleghorn (l.c.) as a useful sand-binding creeper.

12. *C. rosea*, DC., Prodr. ii. (1825) 404. *C. obtusifolia*, DC. Prodr. ii. 402; Miq. Fl. Ind. Bot. i. (1855) 215; Benth. in Ann. Wien. Mus. ii. 135; Baker in Hook. f. Fl. Brit. Ind. ii. (1876) 196 (as far as regards Malay Penins. plants); Bailey, Queensland Fl. (1900) 431; Gagnep. in Bull. Soc. Bot. Fr. lxii. (1915) 292; in Lecomte Fl. Gen. Indo-Chine ii. 262 (1916); Chevalier in Expl. Bot. Afr. Occ. Fr. (1920) 1971. *C. maritima*, Thou. in Desf. Journ. de Bot. 1813, 80; Hiern, Cat. Welw. Afr. Pl. i. 254. *C. lineata*, Prain in Journ. As. Soc. Beng. lxi. ii. (1897) 63; Merrill Philipp. Journ. Sci. v. (1910) 125; ix. (1914) 92; Merrill, in Interpret. Rumph. Herb. Amboin. (1917) 281; Rock, Legum. Hawaii (1920) 207 t. 32 (non DC.); *C. emarginata*, G. Don, Gen. Syst. ii. 362? *C. Findlaysoniana*, R. Grah. in Wall. Cat. 5535? *C. moneta*, Welw. Apont. 588 n. 62; Hiern. l.c. 254. *Dolichos roseus*, Sw. Fl. Ind. Occ. 1243 (1806). *D. obovatus*, Schum. et Thonn. Beskr. Guin. Pl. (1827) 341. *Cacara litorea*, Rumph. Herb. Amboin. v. t. 141. f. 1.

MALAY PENINSULA. Pangalan Balak; Malacca, *Burkill* 3514; Pahang, *Burn Murdoch*; *Ridley*; Pahang, *Curtis*; Tringganu, *Roslade*; Singapore, *J. S. Gamble*.

MALAY ARCHIPELAGO. N. Borneo, *Burbidge*; Java, *Jungkuhn* 206, *Horsfield*, *Savinierre* 1144; Amboina, *Robinson* 553; Sarawak, Baram, *Hose* 605; Sarawak, *Hose* 54; Borneo, *Haviland* 1016; Timor Laut, *H. O. Forbes* 3347; N. Guinea, *Meyer*; Celebes, *Koorders* 17571.

PHILIPPINE ISLANDS. Malabon, *Loher* 2297, 2298; Manila, *Merrill* 379, 3423; Bauang, *Elmer* 5650; Bataam, *Elmer* 7033.

INDO-CHINA. Siam; Sriracha, *Kerr* 2130, *Collins* 31; Ha-tua, *Godefroy*.

N.E. AUSTRALIA. Howick Is., *Muller*; Lord Howe's Is., *Moore* 55; R. Brown 4224; Queensland, *Banks & Solander*; Hann 77; Port Curtis, *MacGillivray* B49; Cape York, *Daniel*; Port Darwin, *Schomburgh* 185.

N.W. AUSTRALIA. Dampier's Arch., *A. Cunningham*; Foul Point Bay, *A. Cunningham*; Nicol Bay and Grey River, *Ridley's Exped.*; Point Pearce, *Muller*; Upper Victoria River, *Miller*; N.W. Coast, *Bynde*; between Ashburton and Grey Rivers, *Clement*.

NEW ZEALAND. Kermadec Group; Meyer Islet, *Cheeseman*.

POLYNESIA. New Caledonia, Isle of Pines, *MacGillivray* (H.M.S. Herald) 789; Solomon Islands, *Gaudalcat*, *Milne* (H.M.S. Herald) 547; Fiji Islands, *Vuna*, *Seeman* 122; Samoa, *Whitmee* 83; Tuamaga, *Powell* 67; Society Islands, *Forster Herb*.

TROPICAL AFRICA. Liberia, *Whyte*; Gold Coast, *Chipp* 57; Nigeria, Brass, *Barter* 53, Mouth of Kwalbo River, *Talbot* 3089; Lagos, *Dalziel* 1212; Benin, *Debeaux* 149; Kamerun, *Preuss* 1281; Batanga, *Bates* 68; Congo, Mayoniba, *Debeaux* 103; St. Thomas Island, *Mollen* 104; Ambriz, *Welwitsch* 2192; Praia de S. Thiago, *Welw.* 533, (the seeds are here used by the natives as small change); Zanzibar Island, *Hildebrandt* 1197; Mouth of W. Luabo, *Kirk* 9; Beira, *Cecil* 243.

MASCARENE ISLANDS. Madagascar, *Baron* 6700; Mauritius, *Ayres*; Rodrigues, *Balfour*; cult. from seed from Seychelles at Biloxi, Miss. U.S.A. *S.P.I.* 34625.

SOUTH AFRICA. *Drege*; Durban, *J. M. Wood* 1299; *Rudatis* 1611; Coast of Natal, *Cooper*.

As appears in the synonymy Rumphius's figure of *Cacara litorea* is here regarded as intended for *C. rosea* and not *C. turgida*. Rumphius describes it as creeping like *Soldanella* on the sea-shore. De Candolle founded his *Lablab microcarpus* on this figure and some authors taking it for *C. turgida* have proposed to make it supersede Graham's appropriate name on the ground of priority. Rumphius's figure, however, and the names founded on it belong to the present species.

13. *C. turgida*, *Grah.* in Wall. Cat. (1832) 5534; *Miq.* *Fl. Ned. Ind.* i. 215 (1885); *Prain* in Journ. As. Soc. Beng. lxi

(1897) 417; Gagn. in Lecomte, Fl. Gen. Indo-Chine ii. 161 (1916). *C. gladiata*, DC. var. *turgida*, Baker, Fl. Brit. Ind. ii. 196. *C. obtusifolia*, Prain, Beng. Pl. i. 394; Journ. As. Soc. Beng. lxvi. (1897) 63; Gamble Fl. Madr. i. 360 (non DC.) *C. cathartica*, Thou. in Desf. Journ. de Bot. 1813, 81?. *C. microcarpa*, Piper in Proc. Biol. Soc. Wash. xxx. 176 (Oct. 23, 1917); Merrill, Interpret. Rumph. Herb. (Nov. 1. 1917) 280. *Dolichos rotundifolius*, Roxb. Fl. Ind. iii. (1832) 302 (non Vahl). *Lablab microcarpus*, DC. Prodr. ii. (1825) 402. *Katu Tsjandi*, Rheede, Mal. l.c. t. 45.

INDIA. Sunderbuns, *Hook. f. & Thoms.* 18; Bengal coast, Noakhali, *Clarke* 6618; Concan, *Stocks*; Rangoon, *Wallich* 5531 F; Amherst, *Wallich* 5534; Tenasserim, *Helfer*; Andamans, *Parkinson* 658; *King*.

MALAY PENINSULA. Pulau Redang, *Jensen* 28; Penang, *Wallich* 5534, 5534B; Kelantan, *Ridley*; Perak, *Scortechini* 1391; Pahang, *Ridley* 1198; Singapore, *Burn Murdoch* 159; *Hullett* 330; Durian Shabang, *King's Collector* 1123; Pulau Buru, *Ridley*; Pulau Obin, *Hullett* 463.

MALAYA. Sumatra, *Robinson & Kloss*; Christmas Island, *Ridley* 146; N. Borneo, *Fraser* 210; *Gibbs*, 2738; Amboina, *Robinson* 562; New Guinea, *Pulle* 1871; *Barclay* 4087.

PHILIPPINE ISLANDS. Luzon, *Whitford* 707; Mindoro, *Merrill* 1292; Paragua, *Merrill* 700; Negros Oriental, *Elmer* 10303.

POLYNESIA. Solomon Islands, *Comins* 171; *Guppy* 117; Fiji Islands, *Seeman* 112; Ellice Islands, *McNaughton*; Samoa, *Powell* 37.

MASCARENE ISLANDS. Seychelles, *Horne* 472.

The synonymy of the species and of its sea-shore ally is discussed by Prain (Journ. Beng. As. Soc. lxvi. 419), by Merrill (Interpret. Rumph. Herb. 280) and by Gagnepain (Bull. Soc. Bot. Fr. lxii (1915) 292)

14. *C. Baueriana*, *Endl.*, Prodr. Fl. Norf. (1883) 91.

The only note which should be added to Endlicher's precise and exhaustive description (l.c.) is that the pods vary in length from 9–18 cm. and in width from 2.5–3.5 cm. The endocarp is adherent to the valves of the pod, otherwise it might be confused with *C. turgida*, Graham, which also occurs in the S. Pacific. The ripe seeds are pale brown with a circumference 5 times the length of the hilum.

We have not seen the drawing quoted by Endl. (l.c.) but a specimen collected in Norfolk Island by Backhouse is stated on the label in the Kew Herbarium to be "apparently Endlicher's plant: compared with Bauer's drawing Nov. 1867." It exactly corresponds with the description.

NORFOLK ISLAND: *Backhouse* 644.

COOK ISLAND. Roratonga, *Cheeseman* 540; Cult. Washington, D.C., U.S.A., *S.P.I.* 41619, (seeds New South Wales).

15. *C. ferruginea*, *Piper*, sp. nov., *C. roseae*, DC., affinis, sed habitu scandente et legumine ferrugineo distat.

Herba scandens; caules teretes, dense deflexo-puberuli. *Folia* pinnatim trifoliolata; stipulae lanceolatae, basi latiores, rubro-puberulae, caducae. *Foliola* membranacea, late ovata, apice acuta vel breviter acuminata, apiculata, basi rotundata, reticulata, utrinque parce praecipue subtus strigillosa, 7-15 cm. longa, 4-10 cm. lata; petioluli carnosii, densissime ferrugineo-puberuli; stipellae lineari-lanceolatae et similiter puberulae. *Racemi* 12-20-flori; pedunculi robusti, ad 40 cm. longi, dense ferrugineo-reflexo-puberuli; pedicelli brevissimi, basi glandula magna globosa instructi. *Calyx* campanulatus, dense adpresse ferrugineus, 15 mm. longus; labium superius latum, marginatum; labium inferius parvum, dentibus 3 obtusis, late deltoideis, medio paullo longiore. *Corolla* rubella vel purpureo-rubella, 2-2.5 cm. longa. *Vexillum* obovatum, alte emarginatum, lateribus reflexis, medio plicatum, basi bicallosum, obtuse bi-auriculatum, ungue longo angusto. *Alae* carinis aequilongae, medio obtuse dentatae, basi inflexo-auriculatae, lamina unguibus bis longioribus. *Carina* lata, obtusa; petala apice libera, medio cohaerentia, basi anguste hamata, laminis unguibus bis longioribus. *Stamina* pistillo aequilonga, ad basem monadelpha. *Ovarium* dense breviter ferrugineo-tomentosum. *Stylus* subtus hirsutus; stigma terminale paullo obliquum. *Legumen* robuste pedicellatum, parce brunneo-puberulum, fere rectum, compressum, 15 cm. longum, 2.5 latum, rostro valido recurvato, juxta suturam superiorem utrinque costa contigua longitudinali instructum, costis a suturis 4-5 mm. distantibus, endocarpio valvis adhaerente. *Semen* ellipsoideum, compressiusculum, fulvum, micans, 16 mm. longum, 10 mm. latum, 8 mm. crassum; hilum late lineare, nigrum, 10 mm. longum, anguste brunneo-marginatum.

TROPICAL AFRICA. Lake Nyasa; east shore, *W. P. Johnson* 70; Nyasaland, *J. Buchanan* 1086; Moweh, Shire River, *Dr. J. Kirk*.

SOUTH AFRICA. Transvaal; Barberton, *E. E. Galpin* 866, Crocodile River Drift, *H. Bolus* 7734; Natal, *W. T. Gerrard* 304, Inanda, *J. M. Wood* 1238.

16. *C. plagiosperma*, *Piper*, sp. nov., *C. roseae*, DC., affinis, sed seminis figura et calyce strigilloso distat.

Herba annua, scandens, 1-plures m. alta, omnino strigillosa; caules teretes. *Foliola* membranacea, obscure reticulata, late ovata, apice acuta, basi rotundata vel obtusa, 10-13 cm. longa; petioluli carnosii, puberuli. *Racemi* circiter 10-flori. *Calyx* viridis, nigro-maculatus, strigillosus; labium superius emarginatus; labii inferioris dentes 3 late deltoidei, acuti, subaequales. *Corolla* purpurea. *Alae* carinam obtusam aequantes. *Legumen* lineare compressissimum, subrectum, strigillosum, 20-25 cm. longum, 4 cm. latum, rostro recurvo, costis a sutura superiore 5 mm. distantibus. *Semina* circiter 10, ellipsoidea, compres-

sisissima, micantia, basi abrupte angustata, 2.7 cm. longa, 1.7 cm. lata, 1 cm. crassa, ochraceo-rubida; hilum lanceolatum 1 cm. longum, saepe basale, nigrum, anguste brunneo-marginatum.

Secured from Dr. P. Boname, Director of Agriculture, Mauritiu* sand grown at Biloxi, Mississippi, Miami, Florida and in the greenhouse at Washington, DC. No. 02053; also from Nicaragua No. 02735.

COLLECTORS' NUMBERS.

- Backhouse 644 *C. Baueriana*, Endl.
 Balfour 424 *C. virosa*, W. & A.
 Barber 716 *C. podocarpa*, Dunn.
 Barbey 829 *C. virosa*, W. & A.
 Barclay 4087 *C. turgida*, Grah.
 Baron 1442, 4370 *C. virosa*, W. & A.; 6700 *C. rosea*, DC.
 Barter 1607 *C. regalis*, Dunn; 53 *C. rosea*, DC.
 Bates 68 *C. rosea*, DC.
 Bell 270 *C. virosa*, W. & A.
 Bolus, H. 7734 *C. ferruginea*, Piper.
 Bourne 882, 3222, 3371, 11186 *C. virosa*, W. & A.; 2219
C. podocarpa, Dunn
 Broun, Mr. & Mrs. A. F. 1375 *C. regalis*, Dunn.
 Brown R. 4224 *C. rosea*, DC.
 Buchanan, J. 1086 *C. ferruginea*, Piper.
 Burkill 3514 *C. rosea*, DC.
 Burn Murdoch 159 *C. turgida*, Grah.
 Cecil 243 *C. rosea*, DC.
 Cheeseman 540 *C. Baueriana*, Endl.
 Chipp 57 *C. rosea*, DC.
 Clarke 13809, 17395 *C. gladiata* DC.; 6618 *C. turgida*, Grah.
 Collins 31 *C. rosea*, DC.
 Comins 171 *C. turgida*, Grah.
 Dalziel 1212 *C. rosea*, DC.
 Debeaux 103, 149 *C. rosea*, DC.
 Douglas 6 *C. galeata*, Gaud.
 Elmer 6870, *C. luzonica*, Piper; 10303 *C. turgida*, Grah.;
 5650, 7033 *C. rosea*, DC.
 Eyles 1445 *C. ferruginea*, Piper.
 Faurie 152 *C. lineata*, DC.
 Forbes, H.O. 3347 *C. rosea*, DC.
 Ford 636 *C. obcordata*, Voigt.
 Foster 129 *C. africana*, Dunn.
 Fraser 210 *C. turgida*, Grah.
 Galpin 866 *C. ferruginea*, Piper.
 Gerrard, W. T. 304 *C. ferruginea*, Piper.
 Gibbs 2738 *C. turgida*, Grah.
 Gossweiler 5626 *C. africana*, Dunn.
 Guppy 117 *C. turgida*, Grah.
 Hance 5196 *C. lineata*, DC.

* Since the paper was set up we find that *C. plagiosperma* is a native of Cuba.

- Hann 77 *C. rosea*, DC.
 Haviland 1016 *C. rosea*, DC.
 Henry 12424 *C. virosa*, W. & A.; 153, 8046 *C. lineata*, DC.
 Hildebrandt 1197 *C. rosea*, DC.
 Hook. f. & Thoms. 18 *C. turgida*, Grah.
 Horne 472 *C. turgida*, Grah.
 Hose 54, 605 *C. rosea*, DC.
 Hullett 330, 463 *C. turgida*, Grah.
 Jenkins 22 *C. gladiata*, DC.
 Jensen 28 *C. turgida*, Grah.
 Johnson 70 *C. ferruginea*, Piper.
 Junghuhn 206 *C. rosea*, DC.
 Keith 321 *C. virosa*, W. & A.?
 Kerr 1532 B. *C. virosa*, W. & A.; 2130 *C. rosea*, DC.
 King's Collector 1123 *C. turgida*, Grah.
 Kirk 9 *C. rosea* DC.
 Koorders 17571 *C. rosea*, DC.
 Lamont 183A *C. obcordata*, Voigt.
 Loher 2293, 2295 *C. luzonica*, Piper; 2297, 2298 *C. rosea*, DC.
 MacGregor 177 *C. africana*, Dunn.
 Macgillivray 49B *C. rosea*, DC.
 Manila, Bur. Sci. 167 *C. gladiata*, DC.
 Merrill 3172, 3811, 963 *C. luzonica*, Piper; 379, 3423, *C. rosea*,
 DC.? 700, 1292 *C. turgida*, Grah.
 Milne 547 *C. rosea*, DC.
 Mollen 104 *C. rosea*, DC.
 Moore 55 *C. rosea*, DC.
 Oldham 176, 177, 358 *C. lineata*, DC.
 Parkinson 658 *C. turgida*, Grah.
 Powell 67 *C. rosea*, DC.; 37 *C. turgida*, Grah.
 Preuss 1281 *C. rosea*, DC.
 Pulle 1871 *C. turgida*, Grah.
 Ridley, 146, 1198 *C. turgida*, Grah.
 Ritchie 201 *C. virosa*, W. & A.
 Robinson 553 *C. rosea*, DC. 562 *C. turgida*, Grah.
 Rudatis 1611 *C. rosea*, DC.
 Sauliere 587 *C. virosa*, W. & A.
 Savinierre 1144 *C. rosea*, DC.
 Schomberg 185 *C. rosea*, DC.
 Schweinfurth 2816 *C. virosa*, W. & A.
 Scortechini 1391 *C. turgida*, Grah.
 Seeman 112 *C. turgida*, Grah.; 122 *C. rosea*, DC.
 Speke & Grant 628 *C. africana*, Dunn.
 Swynnerton 442 *C. ferruginea*, Piper.
 Talbot 3089 *C. rosea*, DC.
 Thwaites 1484 *C. podocarpa*, Dunn.
 U.S.A. Dept. Agric. S.P.I. 34625 *C. rosea*, DC.; 02053, 02735
C. plagiosperma, Piper; 416 *C. Baueriana*, Endl.
 Wallich 5531F, 5534, 5534B *C. turgida*, Grah.; 5531D,
 5531E *C. virosa*, W. & A.; 5532A *C. podocarpa*, Dunn.

- Welwitsch 533, 2192 *C. rosea*, DC.
 Whitford 707 *C. turgida*, Grah.
 Whitmee 83 *C. rosea*, DC.
 Wight 736, 750 *C. virosa*, W. & A.
 Wight Cat. 748 *C. podocarpa*, Dunn.
 Wight Herb. 253 *C. podocarpa*, Dunn.
 Wood, J. M. 1238, *C. ferruginea*, Piper; 1299 *C. rosea*, DC.
 Wright, C. 129 *C. obcordata*, Voigt.
 Yapp 256 *C. gladiata*, DC.

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- africana*, Dunn above, p. 135—Afr. trop.
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 N. Caled.
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ferruginea, Piper, above, p. 141—Afr. trop. et Austr.
Findlaysoniana, R. Grah. in Wall. Cat. n. 5535 = *rosea* ?
galeata, Gaudich. Freyc. Voy. Bot. 486—Ins. Sandw.
Gaudichaudii, Endl. in Ann. Wien. Mus. i. (1836) 186 = *galeata*.
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lineata, DC. Prodr. ii. 404 (1825)—As. or.
Loureirii, G. Don, l.c. 363 = *gladiata*.
Luzonica, Piper in Biol. Soc. Wash. xxx. 177 (1917).
macrobotrys, Merrill³ in Philipp. Journ. Sci. Bot. (1915) x. 13
 —Ins. Guam.
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gladiatus, Jacq. Ic. Rav. t. 560 (1786-93) = *C. gladiatus*.

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obtusifolius, Lam. Encycl. ii. 295 (1786) = *C. rosea*.

roseus, Sw. Fl. Ind. Occ. 1243 (1806) = *C. rosea*.

rotundifolius, Roxb. Fl. Ind. iii. 302 = *C. turgida*.

rotundifolius, Vahl, Symb. Bot. ii. 87 = *C. rosea*.

Lablab microcarpus, DC. Prodr. ii. 402 = *turgida*, Grah.

* * * * *

1. *C. Bouquete*, Montr. Specimen not seen. Neither the genus nor the species is determinable from the description.

2. *C. incurva*, DC. is not a *Canavalia*. The name is founded on *Dolichos incurvus*, Thunb., which the author identified with Japanese *Nata mame*. That name means "sword bean" and has been given by some Japanese authors as equivalent to the Sword Bean, *Canavalia gladiata*. But Thunberg's description shows his plant to be different in many respects from that species and even from the genus. It seems probable therefore that Thunberg connected the plant he was describing with *Nata mame* wrongly.

3. *C. macrobotrys*, Merr., *C. megalantha*, Merr. and *C. tortilis* Frapp. We have seen no specimens and the species cannot from the descriptions be placed in the Key.

XXII.—A SHORT TRIP ON MT. ELGON, UGANDA.

C. H. LANKESTER.

In August last year, at the conclusion of a visit to inspect the Native Coffee Cultivations of the Bagisu, on the western slopes of Mt. Elgon, I had the good fortune to meet there, on Safari, the District Commissioner on tour, and proximity to the nearest route up the mountain suggested a hurried trip to the Jackson Summit. This was planned and duly carried out, four days being taken in all, including the return to Mbale.

The folds and valleys of the Elgon foothills where these meet the Bukedi plain are very densely populated, the lowest hills especially are almost covered by banana "shambas" of the native Bagisu, who differ very widely from the type of negro inhabiting the Kingdom of Buganda, with whom I had had a short introductory acquaintance.

The Bagisu are of smaller stature and are a much more primitive people, approximating to the Congo Pigmy group. The men wear heavy neck-collars of iron and frequently anklets of the same, the women, scanty costumes, either of fresh banana

leaves, made into a short close-fitting skirt, or from strings of banana fibre, often adorned by a string of blue beads.

As in Uganda proper, at convenient intervals, well kept and picturesque thatched rest houses exist, and from that at Buhugu (about 4,500 ft.) we started on the 23rd August, 1921, for the Bamboo Camp (about 10,000 ft.), having a very steep climb up the grassy slope leading to Butandiga, 7000 ft. This hill seemed interminable, though the porters went up very cheerily. Bananas and "wimbi" lined the road on either hand, with occasional open spaces of scrubby pasturage for sheep and goats, a rather monotonous stretch. One has only to turn round to have a fine panorama of hill and plain, and on attaining the ledge on the road to and nearly at Butandiga, one stands on the periphery of a huge amphitheatre. The varied colours of the cultivated patches below stand out in relief, the "wimbi" shows a vivid yellow, contrasting admirably with the bluish green of the bananas and the deeper green of the small isolated patches of forest. At this ledge and onwards there is much of botanical interest. The road lies to the left of an almost perpendicular rocky bluff covered with Aloes, Crassulas and many species of ferns, including fine *Adiantums*. From here to the Bamboo Camp the slope is gentle, the road is of soft close turf, making walking easy and goes through low scrub with much bracken and bramble on either hand, among which, near the camp, were some gigantic *Crinums*, not then in flower. At one point the track lies very close to the edge of a rock precipice and one looks down nearly 3,000 ft. into the tumbled valley below. The road itself is of rock for a hundred yards or so, and in all soil-retaining cracks is a lovely little blue-flowered *Commelina* with finely fimbriate segments.

Upwards the vegetation begins to change and definitely montane types appear, occasionally *Helichrysums* and a terrestrial orchid with inconspicuous, dull green flowers are noticed. There was on the whole a marked absence of bloom, and evidently the visit was unfortunately timed in this respect. Heather of a tall straggling form (*Erica arborea*) increased in abundance as we climbed; buds were showing, but did not promise great attractiveness. The *Helichrysums* though full of buds showed only here and there an occasional silvery white, pink-tipped flower-head. On one of the ridges were several patches of a fine *Impatiens*, 3 to 4 ft. high, supported in the surrounding vegetation, with broad, white, maroon-centred flowers and deliciously fragrant. Higher up we reached a belt of forest of medium height, mainly *Podocarpus* (*P. milanjanus*, Rendle), picturesquely draped with *Usnea*, so reminiscent of the common tropical American *Tillandsia usneoides*, and shortly after, we reached the outposts of the bamboos. The species here, slender, erect and with very long nodes, is not nearly so beautiful as the feathery, arching *Chusqueas* of the Central American uplands. From here on we had occasional glimpses of the summit, very

fine in the afternoon sun, but drifting clouds soon cut them off and enveloped us also before we reached camp. After a short rest we took an evening stroll to the Sasa river, some two miles above the camp. Close to the river, especially on the swampy ground bordering it, was a wealth of floral display. A low bridge of bamboo spans the creek and on the left grew at odd intervals, for a distance of some twenty yards up the river side, a fine white *Begonia*, eighteen or more inches in height, with pure white flowers of good size. Dotted about, the spikes of *Kniphofia Snowdenii* stood like solidified flames. Two species of terrestrial orchids, one rose-pink, the other a marvellous Tyrian Red, adorned the mossy openings in the low herbage, and close to the *Begonia* were two groups of a curious *Gladiolus* (?) with large plum-pink bracts, concealing the inconspicuous greenish flowers, one plant of a small *Echinops*, with bluish heads, and a tiny *Veronica* (*V. abyssinica*, Hk. f. ?), quite abundant, with unopened buds. Everywhere a scentless violet (*Viola abyssinica*, Steud.), decked the ground or climbed up amongst every kind of growth and in many places a silvery-blue *Anagallis* starred the green carpet of short moss. Near here, a very ornamental epiphytic *Canarina* (*C. Eminii* Asch. & Schweinf.), with large pendant orange-coloured bells, occurred on the lower branches and trunks of trees, but was not abundant. We returned to camp with material of our finds, losing to my regret, the only specimen of a charming blue Acanthaceous plant, not again encountered.

The next morning, after an intensely cold night, saw us off rather later than usual and within half an hour of our start rain began to fall and with the briefest interruptions continued all day, until nearing camp on our return in the evening. Then it continued fine, and we had glorious views of the mountain behind us, and in front right over the plain to Lake Kioga. The rain had spoilt much of the enjoyment of the tramp and only the determination of my companion kept me going, as my own inclination would have led me to potter around botanizing in likely spots. The vicinity of the Jackson Summit is rather bleak and on such a day the occasional glimpses we had of our surroundings were rather gruesome, but might be very different in blazing sunshine. One little shallow valley, full of the tree *Senecio* (*A. adnivalis*, Stapf), common all over the mountain at 12,000 ft. or so, was a very eerie spot in the mist, the dank, dead, black leaves hanging below the terminal green tuft, forming funereal and depressing objects. The general colouring of the landscape was a dull rusty brown varied by the grey lichen covered rocks. Not many of the extraordinary hollow-stemmed giant *Lobelias* were up, the majority were in the early stages of growth, a rosette close to the ground. A few were in flower at over 13,000 ft., fascinating plants, alone worth the journey to see. On the moorland, stretches were brightened by the spikes of *Kniphofia Snowdenii* and patches of a dainty Iridaceous plant with hanging pink flowers on very slender

peduncles were frequent. Here also occasional *Habenarias*, singly or in little groups, the best being *H. praestans*, with ciliated lip. A *Rubus*, with huge yellow fruits, nestled in one rock group, but did not appear again. Usually any species of this genus is so abundant in any region it occurs, the seeds being dispersed everywhere by the birds. Again, a finer day might have disclosed quantities of it. A tiny inconspicuous *Sisyrinchium* grows in the path and was in flower. The *Helichrys*ums, so dense everywhere, were less advanced than those at the Bamboo Camp. An acaulescent Composite with bright yellow flowers was dotted all over one stretch, the under side of the green leaves covered with white tomentum. The scramble up the boulder strewn summit, where we recorded our visit in the jar at the cairn, just about finished the interest of the day. Sleet fell up there and whitened the ground in places where it lodged. Below timber line on the way down the going was very soft. A species of *Rhus*, 25-40 ft. high grows here, with long pendant panicles, the ferruginous red of the dead leaves contrasting well with the pale green of the living. Not seen on the way up, a species of *Gentianaceae* with dull purple flowers was found here, the undergrowth being studded by a pretty pink *Impatiens*, a foot in height. Few epiphytic orchids were encountered, one *Angraecum*, a *Listrostachys* with small orange-red flowers and three species of *Polystachya*; and these not abundantly. Next day, the 25th, we returned from the Bamboo Camp to Budadiri, a long downhill march by the same route traversed two days previously. The morning was gloriously fine and camp was reached at 11.30. The day following we returned to Mbale, cycling wherever possible. At one place some six miles from our destination the knee-high grass was studded by a tall herbaceous plant with handsome white flowers, one of the most ornamental of the wild flowers of Uganda. At any point of the road, fine views of the immense cliffs of Elgon, could be obtained by looking back until nearing Mbale, when they are shut off by the grey forest-crowned mass of Nkokenjira, the westernmost bastion of Elgon, which hides from view at that station nearly the whole of the mountain, except the spurs to the northward. It may not be fair to draw inferences from so short and hurried a visit, though comparison is only natural. My impression is that the flora of the American Cordilleras at near the same elevation and latitude, is incomparably richer and more attractive; of the epiphytes this is overwhelmingly true. What renders comparison of the two floras so fascinating, is the production, under almost identical climatic conditions, of similar types in widely divergent families, especially in those of xerophytic forms.

For this delightful trip, marred only by the unfortunate weather prevailing at the summit, my warmest thanks are due to my fellow traveller, who made the journey possible and ensured its success.

XXIII.—NEW SPECIES FROM MOUNT EVEREST.

These new plants were collected by Mr. A. F. R. Wollaston, Medical Officer and Naturalist to the Mount Everest Expedition, 1921, and a complete set of the whole collection was presented to the Royal Botanic Gardens, Kew, by the Mount Everest Committee.

Mr. Wollaston has kindly supplied some particulars concerning the habitats :—

“The plants described in the following paper were collected in Tibet between May and September 1921, and with two exceptions they were all found in the neighbourhood of Mount Everest. The *Androsace* was found flowering in May at 17,000 ft. on Chumolhari, a mountain about 130 miles E. of Mt. Everest. *Primula Buryana* was found near Lapche Kang, about 50 miles W. of Mt. Everest; it was seen in one place only where it covered the ground for an acre or more, and so white was it that it was difficult to see when the ground was covered with a sprinkling of snow.

“The region of about 13,000 ft. represented by a *Tanacetum* and a *Dracocephalum*, is a comparatively dry zone, more Tibetan than Himalayan in character. The region above 15,000 ft., from which come two *Primulas* and a *Gentian*, is characterised by an abundant moisture, that is to say, it is more often than not enveloped in a dense and dripping fog. Of the two *Primulas* *P. Wollastonii*, which was also found near Lapche Kang, has a very restricted range at 15,000 ft., where it is found growing on sheltered mossy slopes: *P. Younghusbandii* was found from 17,000 to nearly 19,000 ft. under the shelter of large boulders; the newly-opened flowers of this species are white, becoming a pale mauve after a few days. *Gentiana stellata* has a still wider distribution from 14,000 to 18,000 ft. being most abundant at 16,000 ft. in the early part of September.”

***Aconitum orochryseum*, Stapf** [Ranunculaceae-Helleboreae]; affinitatis dubiae ob tubera et semina ignota, nectariis ut in *A. Anthora*, L., sed inflorescentia pauciflora laxa, galeae forma folisque admodum diversa; potius ad sectionem Napellum referendum sed corolla aurea, galea, nectariis a species Asiae centralis et Indiae distinctissimum.

Tubera ignota. *Caulis* pars exstans 20 cm. longa, gracilis, subflexuosa, superne aureo-tomentella, inferne mox glabrescens pilis crispis, simplex. *Folia* caulina 2-na, versus laminae ortum densius caeterum parce aureo-pubescentia vel praeter nervos subglabra, petiolata, petiolo folii inferioris 2·5–5·5 cm. longo, superioris (florem infimum subpetentis) 0·7–1 cm. longo; lamina folii inferioris ambitu late reniformis vel late cordato-ovata, sinu lato, a sinu ad apicem 3–4 cm. longa, 4–7 cm. lata, 5-subpedati-partita, divisionibus ambitu oblongis vel obovato-oblongis vel intermedia lanceolata grosse laciniato-dentatis, laciniis ve

dentibus utrinque circiter 3 majoribus iterum dentatis; lamina folii superioris similis nisi redacta. *Inflorescentia* racemum laxum 3-florum referens; axis primarius et pedicelli indumento eodem ac caulis; pedicelli 3.5–1.5 cm. longi, recti vel subflexuosi, apice in discum ad 3 mm. latum dilatati, unus ex axilla folii summi ortus, secundus cum bractea quam folium praecedens multo magis reducta et ex eo ipso 2–10 mm. supra basin emissa; bracteolae 2-nae vel in pedicello summo 3-nae, tenuiter filiformes, 5–3 mm. longae, flexuosae. *Sepala* aurea, tenuiter pubescentia; summum galeiforme, erectum, rostratum, pone rostrum magis minusve constrictum, 2.4–2.8 cm. altum, 1.5–2.2 cm. latum (a latere visum et rostro incluso), rostro 0.6–1 cm. longo; lateralia late oblique obovato-rotundata, vix unguiculata, 1.5–1.8 cm. longa et lata; inferiora subdeflexa, oblongo-lanceolata, 1.5–1.8 cm. longa, 6–7 mm. lata. *Nectaria* cucullata, unguibus erectis 1.6–1.7 cm. longis aureo-pilosis, cuculla sigmatoidaeo-curvata, apice obtuso plane recurvo nigricante, labio lato 2-lobo atrovioleaceo, caeterum pallida. *Filamenta* circiter 1.2 cm. longa, ultra medium subanguste alata, alis subito contractis, supra eas aureo-pilosa. *Carpella* 5, sub anthesi arcte conniventia, dense flavo-pubescentia, 4–4.5 mm. longa; styli 2 mm. longi.

MOUNT EVEREST EXPEDITION, 1921, 15,000 feet, yellow, August, *Wollaston* 16.

Tanacetum khartense, *Dunn* [Compositae-Anthemideae]; affinis *T. tibetico*, Hook. f. & Thoms., sed involucri bracteis oblongis nec orbiculatis differt.

Herba gracilis, perennis, diffusa, superne indumento albo tenui vestita, ramis ascendentibus ad 15 cm. longis, infra nuda. *Folia* ambitu orbicularia, breviter petiolata, 1–2-pinnata, 1–1.2 cm. longa, laciniis linearibus obtusis. *Capitula* numerosa, mediocria, cymoso-corymbosa, 0.7–1 cm. lata, pedicellis ad 1 cm. longis. *Involucrum* campanulatum; bracteae multiseriatae, imbricatae, oblongae, obtusae, 4 mm. longae, margine anguste scariosae, breviter fimbriatae, paucae exteriores breviores. *Receptaculum* conicum, nudum. *Corolla* ♂ tubulosa, infra abrupte angustata, 5-dentata. *Antherae* inclusae, basi muticae. *Ovarium* glabrum, pappo 0; stylus tandem exsertus; stigmata linearia, obtusa.

MOUNT EVEREST EXPEDITION, 1921, Kharta Valley at 13,000 ft. August, 1921, *Wollaston* 133.

Androsace sessiliflora, *Turrill* [Primulaceae-Primuleae]; affinis *A. Selago*, Hook. fil. et Thoms. ex Klatt, sed foliis superioribus praecipue longe villosis, floribus minoribus sessilibus distinguitur.

Planta dense caespitosa, ramosa, ramis parte inferiore fusco-atris foliis emarcidis squamosis obtectis. *Folia* dense imbricata in globulos multos compactos 3 mm. diametro albovirides densissime coarctata; inferiora late oblanceolata, 2 mm. longa, 1 mm. lata, plus minusve longe villosa; folia media elliptica,

3.25 mm. longa, 1.5 mm. lata, margine praecipue pilosa; folia superiora anguste lanceolata, 3.25 mm. longa, 0.75 mm. lata, dorso margineque longe albo-villosa. Flores solitarii, sessiles, 3 mm. longi. Calyx 2.5 mm. longus, alte quinquefidus, segmentis late oblongo-lanceolatis obtusis villosis 1.5 mm. longis 1 mm. latis. Corollae tubus 2.5 mm. longus, fauce 1.5 mm. diametro; lobi rotundato-obovati, 1.5 mm. longi, 1.25 mm. lati, leviter emarginati, flavi (?); fornice aurantiaci (?), 0.5 mm. longi, truncati. Antherae 1 mm. longae. Ovarium late subspherioideum, 0.75 mm. altum; stylus vix 1 mm. longus.

MOUNT EVEREST EXPEDITION, 1921, Wollaston 303.

This interesting species of *Androsace* must be a very beautiful plant when in flower. The stems grow together in dense compact masses. Each branch terminates in a close small mass of leaves, from the centre of which a solitary sessile flower arises. In this "globulus" it is scarcely possible to distinguish the individual leaves without dissecting, since the long white villose hairs form a grey felt covering. It would appear from the material available that the entire plant scarcely exceeds 2 cm. in height. The flowers are always completely sessile so far as can be judged from the material collected by Mr. Wollaston.

The species is to be placed in the section *Aretia*, and is compared above with *Androsace Selago*, Hook. fil. et Thoms., which is found in the Sikkim Himalaya and Tibet.

It is interesting to mention some of the species, belonging to widely different genera, occurring in the Himalayas, which have a similar habit of growth with short stems and dense terminal "globuli" of small leaves. Besides various species of *Androsace*, especially some belonging to the section *Aretia*, there may be recalled *Myosotis Hookeri*, C. B. Clarke, *Saxifraga hemisphaerica*, Hook. f., and several other related species of *Saxifraga*.

Primula Buryana, Balf. f. [Primulaceae-Primuleae]; species *P. Wattii*, King, affinis sed foliis plus minusve ovalibus gracilibus, floribus albis hirtis longe scaposis differt.

Folia petiolata sub anthesi 4 cm. longa; lamina tenuis ovalis vel elliptico-ovalis vel oblongo-ovalis vel subovalis utrinque laevis et pilis vesiculososis septatis sparsim pilosa apice rotundata, margine irregulariter grosse dentato-crenulata ciliata, basi in petiolum aequilongum anguste membranaceoalatum attenuata. Scapus circiter 18 cm. altus ex toto lanatus; capitulum albi-florum flores 5 evolutos gerens et aliis sterilibus nigro-coronatum; bracteae lanceolatae nunc atro-purpureae. Calyx cupularis latus submembranaceus viridis vel nunc postice nigro-purpureus circiter 6 mm. longus ad medium 5-lobatus extus pilis vesiculososis dense vestitus; lobi subaequales posteriores paullo latiores ovati obtusi vel subacuti. Corolla tenuis ad 1.8 cm. longa; tubus in flore longistylis infundibuliformis 7 mm. longus calycem longe superans intus puberulus extus dense pubescens exannulatus in limbum 5-lobum subzygomorphum infundibuliformem extus pilis farini-potentibus indutum expansus, lobi ad 8 mm.

longi, 7 mm. lati, obovatis bifidi segmentis integris vel obscure crenulatis acutis. *Stamina* in flore longistylis infra medium tubi corollini inserta. *Gynaeceum* in flore longistylis tubum corollinum aequans; ovarium discoideum circiter 1.5 mm. latum; stylus albus; stigma capitatum magnum fere 1 mm. diam.

MOUNT EVEREST EXPEDITION, 1921: Lapchi Kang, 15,000 ft. Flowers white. Delicious scent. *A. F. R. Wollaston*, 180, July.

***Primula Wollastonii*, Balf. f.** [Primulaceae-Primuleae]; species *P. Wattii*, King, affinis sed floribus majoribus, lobis corollae haud dentatis.

Folia efarinosa sub anthesi oblanceolata ab apice rotundata deorsum gradatim attenuata circiter 4.5 cm. longa, 1 cm. lata, utrinque pilos septatos vesiculosos numerosos gerentia et glandulis farini-potentibus vestita, costa media erubescens, margine irregulariter et grosse dentata dense ciliata. *Scapus* ad 18 cm. latus infra glaber sub capitulo dense albo-farinosus; capitulum flores deflexos 5-6 evolutos gerens et aliis sterilibus parvis nigro-coronatum; bracteae parvae lanceolatae. *Calyx* cupularis laxus submembranaceus ad 1 cm. longus in flore longistylis tubum corollinum aequans in brevistylis eo brevior extus glandulis farini-potentibus indutus postice atro-purpureus antice viridis vel flavido-viridis; lobi inaequales posteriores maximi ad 5 mm. longi ovati vel rotundati apiculati nunc obscure denticulati. *Corolla* atro-purpurea circiter 2 cm. longa; tubus ad 7 mm. longus exannulatus glaber in limbum glabrum apertum latum infundibuliformi-campanulatum breviter 5-lobatum expansus; lobi late triangulares integri ad 4 mm. longi acuti vel subapiculati. *Stamina* in flore brevistylis ad os tubi corollini in longistylis ad medium inserta; antherae oblongae. *Gynaeceum* in flore longistylis tubum corollinum aequans; ovarium discoideum circiter 1.5 mm. longum; stylus albus; stigma album discoideum recurvum circiter 1.5 mm. diam.

MOUNT EVEREST EXPEDITION 1921: 14-15,000 ft.; 15,000 ft., blue; *A. F. R. Wollaston*, 181 and 189, July and August.

***Primula Younghusbandiana*, Balf. f.** [Primulaceae-Primuleae]; Alba farinosa. *Folia* petiolata; juvenilia 7-8 cm. longa spatulata, parte petiolaris complanata 6-7 cm. longa sub parte laminari obovata vel suborbiculari plus minusve dentata gradatim expansa, ubique glandulis longe stipitatis farini-potentibus induta plus minusve praesertim subtus albo-farinosa; lamina adulta elliptica circiter 2.5 cm. longa 2 cm. lata grosse serratodentata subtus rugulosa et dense albo-farinosa; petiolus adultus ut videtur quam juvenilis brevior. *Scapus* 9 cm. longus cum bracteis, pedicellis, et calyce extus intusque plus minusve albo-farinosus vel glandulis longe stipitatis saepe contortis farini-potentibus vestitus; umbella ad 5-flora; bracteae lineari-subulatae ad 1 mm. longae basi submembranaceae expansae et obscure gibbosae; pedicelli graciles ad 2 cm. longi in anthopodium obconoideum circiter 1 mm. longum expansi. *Calyx* ad 7 mm. longus; tubus cupularis

anthopodium duplo superans ultra medium 5-lobatus; lobi anguste lineari-lanceolati stellatim expansi acuminati. *Corolla* alba in flore longistylis 1.7 cm. longa; tubus fere 1 cm. longus anguste cylindricus erugulosus glaber ad faucem pentagonam annulo parvo flavido 5-lobatus cinctus; limbi plani discus circiter 1.5 mm. latus; lobi obovales 6 mm. lati integri vel obscure crenulati. *Stamina* infra medium tubi corollini inserta calyce multo breviora; filamenta 0.2–2.5 mm. longa strumis corollinis conjuncta; antherae 1.25 mm. longae oblongae apiculatae. *Gynaeceum* tubo corollino brevius calyce paullo longius stigmatibus ab annulo circiter 2 mm. distante; ovarium globosum stylopodio coronatum; stylus in stigma obconoideum angustum sursum dilatatus. *Capsula* parva calycis cupula paullo aucta inclusa.

MOUNT EVEREST EXPEDITION, 1921: Under boulders, 17,500 ft., white; *A. F. R. Wollaston*, 197, September.

Dr. Wollaston writes to me about this species.—It “was the highest species found. It grows up to 18,000 ft. and above. The flowers are white but they fade into a poor kind of pale mauve. The plant is very scarce and was only found on the East (shaded) side of large boulders in the Kharta Valley. I got a small quantity of seed.” It belongs to a section of the genus that is purely Himalayan, the species grouping round the Nepalese *P. rotundifolia* of Wallich—not the Sikkim plant in cultivation under that name, which is *P. cardiophylla*, Balf. f. Other species of the series are *P. cana*, Balf. f., and *P. Littledalei*, Balf. f. The epidermal protective devices in this Mt. Everest species are very conspicuous. The plant is everywhere covered with remarkable long-stalked glands often tortuous and interlocking, secreting white meal.

Gentiana stellata, *Turrill* [Gentianaceae-Swertieae]; *G. Piaszkii*, Maxim., valde affinis, sed foliis et calyce minus scabris, corollae plicis acutis irregulariter serratis, stylo alte bifido, stigmatibus lamellatis differt.

Herba parva. *Folia* caulina superiora, lanceolata vel spathulato-lanceolata, acuminato-mucronata, sessilia, saepissime lateraliter plicata et plus minusve falcata, usque ad 9 mm. longa, anguste albo-marginata, margine minutissime serrulata, costa in pagina inferiore acuta. *Flores* solitarii ad ramulorum apices positi. *Calyx* tubuloso-conicus, alatus, 1.6 cm. longus, 4 mm. diametro, dentibus subulatis acuminato-mucronatis vix serrulatis 4.5 mm. longis. *Corolla* subhypocrateriformis, usque ad 2.5 cm. longa, tubo 2 cm. longo fauce 5 mm. diametro, lobis anguste ovatis acutis 5 mm. longis, 3.5 mm. latis extus viridibus intus intense coeruleis, plicis late ovatis acutis vel subacutis 4 mm. longis 4.5 mm. latis margine irregulariter serratis. *Stamina* vix exserta, antheris 2.5 mm. longis. *Ovarium* stipitatum, circiter 1 cm. longum, stipite 6 mm. longo, stylo 3 mm. longo, stigmatibus lamellatis fere rotundatis vix revolutis.

MOUNT EVEREST EXPEDITION 1921, 14,000–18,000 ft., September, blue, *Wollaston* 215.

This plant is certainly very closely related to *Gentiana Piasezkii*, Maxim., and it has been described as a new species with some hesitation. Of the characters enumerated in the differential diagnosis it seems probable that the shape of the stigmatic lobes will prove most definite.

Gentiana tubiflora, Wall., var. *longiflora*, Turrill, a planta typica floribus longioribus usque ad 4 cm. longis differt.

MOUNT EVEREST EXPEDITION, 1921, 17,000 ft., August, flowers blue, *Wollaston* 212.

The species, *Gentiana tubiflora*, Wall., was originally described from specimens collected in Nepal. It is not uncommon at considerable altitudes in the Central Himalayas and is recorded from Sikkim, Nepal, Kumaon, Tihri-Garhwal and Western Tibet.

Dracocephalum breviflorum, Turrill [Labiatae-Nepeteae]; affinis *D. heterophyllo*, Benth., sed foliis breviter petiolatis, floribus multo minoribus, calyce fere ad basem in labiis duobus diviso facile distinguitur.

Planta herbacea, caulibus erectis vel subascendentibus breviter hispidulis. *Folia* elliptico-lanceolata, apice acuta vel subacuta, basi rotundata vel subcordata, usque ad 3 cm. longa et 1.4 cm. lata, superne hispidula, inferne subpilosa, margine crenato-dentata, in pagina inferiore costa nervisque prominentibus, in pagina superiore impressis, nervis lateralibus utrinque 5-7. *Inflorescentia* fere spicato-capitata, 3 cm. longa; bracteae primariae foliis subsimiles sed minores et margines plus minusve integrae; bracteae secundariae lanceolatae vel lineari-lanceolatae, acutae, 0.6-1.1 cm. longae, glanduloso-hispidulae. *Calyx* bilabiatus, hispidulus, glandulis sessilibus instructus, labiis fere ad basem liberis, tubo 1 mm. longo; labium superius 6.5 mm. longum, trilobum, lobis lanceolatis acutis 2 mm. longis trinervis; inferius 5.5 mm. longum, bilobum, lobis anguste lanceolatis apicem versus angustatis acuminatis 3.5 mm. longis. *Corolla* purpurea (ex *Wollaston*), tubo 1 cm. longo fauce ampliata, extra leviter hispidula; labium superius bilobum, lobis subrotundatis 2 mm. longis; inferius trilobum, lobis lateralibus subrotundatis 1.5 mm. longis, lobo medio valde emarginato 3 mm. longo 4.5 mm. lato in linea media piloso. *Stamina* vix exserta, glabra. *Stylus* 1.3 cm. longus, glaber.

MOUNT EVEREST EXPEDITION, 1921, 13,000 ft., July, purple, *Wollaston* 255.

A comparison of this species with *Dracocephalum heterophyllum*, Benth., has been given above, but the alliance is not close, differences being found in the habit, the leaves, and flowers, most especially in the calyx, which in our plant has a remarkably short, common tube only about 1 mm. in length. The calyx is perhaps more distinctly 2-lipped than that of any previously known species of the genus, and though there is little doubt that it should be placed in Briquet's section *Stenodracontes*, it does

not appear to be closely related to any of the species composing this section, such as *D. heterophyllum*, Benth., *D. acanthoides*, Edgw., from the Himalayas, and *D. Ruprechtii*, Reg., from Tibet.

XXIV.—MISCELLANEOUS NOTES.

Gift of Orchids by Sir George Holford.—Kew is indebted to Lt.-Col. Sir George Holford for many gifts of plants. In 1913 he presented over 200 orchids, chiefly Cattleyas, Cymbidiums, and Cypripediums, which enriched the collection by adding a large number of the best hybrids of these popular genera. The collection was seriously depleted last year by salt poisoning (see *Kew Bulletin*, 1922, p. 7), and Sir George has generously assisted towards its restoration by presenting over 600 plants, including a large number of Miltonias, Cymbidiums, Cattleyas, Laelias, Laelio-Cattleyas, Brasso-Cattleyas and Dendrobiums, many of them large specimens. The value of this noble gift is very great and visitors to Kew have already been able to appreciate Sir George's generosity as many of the plants are now in flower and making a beautiful display in the Orchid Houses.

***Pelargonium citriodorum*.**—Two very different plants have borne the name *P. citriodorum*. One was described by Cavanilles in 1791 under the name *Geranium citriodorum*,* and was transferred to the genus *Pelargonium* by Martius in 1814.† It is presumably a hybrid, and is evidently related to *P. acerifolium*, L'Hérit.,‡ which was regarded by Harvey§ as a variety of *P. angulosum*, Ait., but is now treated by Knuth|| as an independent species.

The second *Pelargonium citriodorum* appeared as a bare name in C. A. Breiter's *Hortus Breiterianus*, p. 331 (1817), and was not described until 1828.¶ It is almost certainly a hybrid, and is apparently related to *P. crispum*, L'Hérit. and *P. limoneum*, Sweet, having the narrow lower petals of the former and the general colouration of the latter. It differs from both in the one-flowered peduncles. *P. limoneum* is supposed to be a hybrid, of which *P. crispum* may be one of the parents. As the name *P. citriodorum* is preoccupied, Breiter's *citriodorum* may be known in the future as *P. citrosium*, Voigt, a manuscript synonym quoted by Breiter. The synonymy of the two supposed hybrids is as follows :—

***P. citriodorum*, Mart., Pl. Hort. Acad. Erlang. Enum. p. 143 (1814);** Dietr. Lexik. Gärtn. Nachtr. vi. p. 50 (1820), excl. syn. nonnull.—*Geranium citriodorum*, Cav. Ic. i. p. 6, t. 8 (1791).

* Cav. Ic. i. p. 6, t. 8 (1791).

† Mart. Pl. Hort. Acad. Erlang. Enum. p. 143 (1814).

‡ L'Hérit. Geraniologia, t. 21 (1787–88).

§ Harv. and Sond. Fl. Cap. i. p. 303 (1860).

|| Engl. Pflanzenreich, Geraniac. p. 461 (1912).

¶ Schrank in Syll. Pl. Nov., Ratisbon, p. 67 (1828).

P. citrosum, Voigt ex Breiter, Hortus Breiterianus, p. 351 (1817), in syn.—*P. citriodorum*, Breiter, l.c., nomen, non Mart.; Schrank in Syll. Pl. Nov. Ratisb. p. 67 (1828), descr.

It may be noted that Dietrich (l.c.) cites *P. citrosum*, Hort., as a synonym of *P. citriodorum*, Mart., and questions whether the latter is synonymous with *Geranium citriodorum*, Cav. This suggests that he may have confused the two hybrids.

T. A. S.

Dates and Date Cultivation of the Iraq.—The subject of Date Cultivation in Mesopotamia was dealt with in the *Kew Bulletin* for 1908, pp. 283–286, and a summary of known authors on the subject in general in the *Bulletin* for 1921, p. 95. The work at present under review was published in 1921 for the Agricultural Directorate of Mesopotamia by W. Heffer and Sons, Ltd., Cambridge. The author, V. H. W. Dowson, states that “the most important area of date cultivation in the Iraq, and, indeed in the whole world is that of the Shat Al’Arab” (opening into the Persian Gulf), where both banks are lined with date gardens from Fao to Qarna a distance of 108 miles, covering over an average width of about a mile on either side of the river, it is estimated, an area of about 138,000 acres of date palms. Bagdad is the next largest centre of date cultivation in the country—it lies amongst 20 miles of date gardens lining both banks of the Tigris. Generally in the Iraq the date palm flourishes everywhere it is watered and attended, from Ana on the Euphrates and Samara on the Tigris southwards. North of these towns the winters are too cold—and nearly all towns in the Iraq are surrounded by date groves and on the Euphrates date groves are common even where there are no towns. Of the many important details that go to make up so thorough an enquiry into the Agricultural practice of a cultivation like the present, it may be sufficient to select a few details on the subjects of fertilization, yield and other crops to be found in the date gardens, as being of special interest.

“Wind pollination cannot be relied upon, and if the pollen from the male flowers does not reach the stigmas of the female flowers, the latter develop into small, stoneless fruit (*A. Shish*) of very little value. Hence, to ensure that fertilization (*A. Ligah*) takes place, the *fellah* in every properly cultivated garden takes a sprig of the ripe male inflorescence (*A. Talaa*, or, more rarely, *Goosh*) and sets it firmly in the middle of that of the female. Both the male and female inflorescences are enclosed in woody spathes (*A. Sharaba*, pl. *Sharabat*) which split open before the flowers mature. It is the custom for the whole, unopened, male spathe to be cut from the palm immediately before ripening and the inflorescence extracted therefrom through an artificial incision, and left a day or two in a small basket to mature. In this way no pollen is wasted. If the *fellah* sees an unopened spathe among the female inflorescences he is fertilizing, he frequently splits it open and sticks the male sprig amongst its

unripe flowers. In a day or so these will ripen, and there will be sufficient pollen left to fertilize them. The *fellah* thus is saved a second journey up the palm." "Occasionally, when the male pollen is scarce, or where there is an unusually large number of females to fertilize in a short time, the pollen is shaken out of the ripe male flowers and tied up in a bag of fine muslin. This bag is tied to the end of a stick. The *fellah* can quickly fertilize a large number of female inflorescences by dusting them with this bag." The period may vary within a week or two but the writer when in Amara in 1918 and 1919 found the process of fertilization confined to the month of April.

A number of tables are given from which a few facts are drawn—"Palms are most dense in Area D, where the average number is 176 per acre, and least dense in Area E, where the average is 84 per acre. The relative frequencies are illustrated in Sketch Map III."

"Throughout the Shat Al 'Arab date zone the average frequency of palms and fruit trees per acre appears to be as follows:—Total Palms and Trees, 179. Total Palms, 140. Total Female Palms, 122:—"Istaamran" 59, "Halawi" 36, "Khadhrawi" 10, "Dairi" 5, "Zahidi" 3, "Digal" 3, "Gantar" 2, "Bairam" 2, "Shoorar" 1, "Others" 1. Total Male Palms, 3:—"Gaimami" 1, "Khikri" 1, "Others" 1. Total Offshoot Palms, 15:—"Halawi" 9, "Istaamran" 4, "Zahidi" 1, "Others" 1. Total Fruit Trees, 39:—"Fig" 9, "Pomegranate" 8, "Citrus" 6, "Vine" 4, "Mulberry" 3, "Quince" 3, "Nectarine" 3, "Apple" 1, "Peach" 1, "Apricot" 1. Other crops in the date gardens included fruits, in addition to those above-mentioned, the "Olive," "Jujube," "Water Melon," &c., several of the ordinary vegetables—"Beetroot," "Cabbage," "Turnip," "Onion," &c. and various, as "Rice," "Wheat," "Barley," "Cotton," "Lucerne," "Ground-nut," "Sesame," &c.

The average yield of "tamar" dates (the third and last stage in the ripening of the date, usually toffee-like and dark coloured, the form in which dates are seen in foreign markets) per acre in the Shat Al 'Arab date lands in the year 1919 appears to have been 4920 lbs. made up as follows:—"Istaamran," 2183 lbs.; "Halawi," 1584 lbs.; "Khadhrawi" 300 lbs.; "Dairi," 160 lbs.; "Zahidi," 378 lbs.; and "Others," 315 lbs.; Total, 4920 lbs.

"The price of dates fluctuates rapidly and between wide limits, so that it is not easy to state with any exactness what is the average price. A very rough approximation to the prices paid to garden-owners during the last two years would be somewhat as follows:—

"Istaamran"	} Rs. 300 a Kara of 6048 lbs.	"Halawi"	{ Rs. 400 a Kara of 6048 lbs.
"Dairi"		"Khadhrawi"	
"Others"		"Zahidi"	
			Rs. 250 a Kara of 6048 lbs.

"Taking these figures as a basis, the gross value of *tamar* dates per acre of Shat Al 'Arab date lands would seem to lie somewhere about 272 Rs. Many conversations with garden-owners tend to confirm this figure. The value per acre over the whole district of the "khalal" (second stage in the development, generally yellow) and "ratab" (soft, juicy—between the hard "khalal" stage and toffee-like "tamar" stage) dates sold might be estimated roughly at 20 Rs."

"No attempt was made during the inquiry to ascertain the value of the fruit other than dates produced in this region. Its value per acre in Areas A and D (*vide* Table xiv.) must be considerable : elsewhere it is negligible."

The primary object of the inquiry was stated to be that of providing reliable statistics of the average yield of dates per unit area with the view to discovering a broad basis for equitable taxation." For the rest the work covers Cultivation, Marketing, Uses, Diseases, Vocabulary of Terms and Map—showing distribution of Date-palms in the area covered by the report and it is well illustrated. The whole is in two parts and a third is promised.

J. H. H.

Rangachari's Manual of Elementary Botany*.—After five years Mr. Rangachari has issued through the Madras Government Press a second edition of his Manual of Elementary Botany for India. The object of the present edition is to enlarge the scope of the Manual and to make it more suitable for general use in the wider circle of professional colleges. It was originally intended for the students of the Coimbatore Agricultural College but has proved of much wider use. Five chapters have therefore been added dealing with the cryptogams of the Indian flora and two more giving introductory essays on evolution, heredity and mendelism.

There must be some doubt, however, whether this edition will be widely required in the north of India, for in the interval between the issue of the two editions a strong competitor has sprung up in the shape of Prof. Bose's Manual intended especially for Calcutta students and a smaller (though of equivalent scope) cheaper and better printed book. Under these circumstances it is unfortunate that the Government Press of Madras have not improved on the first edition. The paper on the contrary is not so good and the printing both of the letterpress and of the illustrations is much worse.

It must however be admitted that the matter both of the original part and of the additional chapters is excellent and reflects great credit on Mr. Rangachari as a careful and successful teacher.

* K. Rangachari. A Manual of Elementary Botany for India. (Second edition; revised and enlarged), Madras 1921.

Botany of Juan Fernandez and Easter Island.*—The first part of the volume under consideration was noticed in the *Kew Bulletin* for 1921, p. 48. The present part contains four papers as follows:—"Die Gasteromyceten der Juan Fernandez und Osterinseln" by T. C. E. Fries, "Freshwater Algae from Juan Fernandez and Easter Island" by K. Münster Ström, and two papers by Dr. Skottsberg dealing with the Phanerogams of Easter Island and Juan Fernandez respectively.

The flora of Easter Island is poor. Skottsberg records 30 species of native Phanerogams, 12 for the first time. Four are considered to be endemic, and three represent an American element; the majority, 23, are Australian and Polynesian.

The Phanerogams considered indigenous to Juan Fernandez number 142. In his two visits to the islands Dr. Skottsberg has added 41 species not previously recorded, 31 of these being listed in the present paper for the first time. The peculiar nature of the Juan Fernandez flora is well brought out by the following figures. Of the genera, 81 in number, 10 are endemic, and *Lactoris* is the type of a separate order. Of the 142 species 98, or 69 per cent. are endemic. There is a marked floristic difference between the floras of the two chief islands, Masatierra and Masafuera.

It is pointed out that many of the endemic types are extremely scarce and it is suggested that the leading scientific circles of the world might well join in an action for the protection of Juan Fernandez. Goats and the spread of "maqui," *Aristotelia maqui*, are the worst causes of the reduction of the indigenous vegetation.

Dr. Skottsberg's valuable contributions to taxonomic and geographical botany are enhanced by his careful references to exact localities and dates of collecting. Many valuable discussions regarding systematic points are to be found in the text and are often illustrated by clear text-figures and plates.

W. B. T.

Agricultural News.—In the issue of March 18, 1922, of this well-known publication of the Imperial Department of Agriculture for the West Indies, it is announced "that consequent on the amalgamation of the Imperial Department of Agriculture with the West Indian Agricultural College, and pending a reconsideration of West Indian requirements in respect of agricultural literature, the publication of this Journal will cease as from March 31 of the current year." It is further announced that the present number (for March 18) is the last that will be issued. There is cause for regret that this useful fortnightly review, which was founded in April 1902 by Sir Daniel Morris, the first Commissioner of the Imperial Department of Agriculture for the West Indies, has thus come to an end. From first to last it has been published at one penny each number, and must have proved

* The Natural History of Juan Fernandez and Easter Island, edited by Dr. Carl Skottsberg. Vol. II., Botany, Part ii. Uppsala 1922, Almqvist and Wiksell.

of great service to all interested in tropical agriculture and especially to agriculturists and planters in the West Indies, for whose benefit it was chiefly intended. Many will entertain the hope expressed in an editorial article which appears in the final issue of the paper that after a while the new West Indian Agricultural College will undertake the publication of a journal which will efficiently continue the work of that now suspended.

Referring to the West Indian Agricultural College a preliminary announcement is made in the Agricultural News to the effect that the College is expected to be open for the reception of a limited number of students in October next. More definite information will be given to West Indian Governments and educational institutions in due course, and in the meantime inquiries may be addressed to the Chief Clerk and Registrar, Imperial Department of Agriculture, Barbados.

Guayule Rubber in Mexico.—*Parthenium argentatum*, known as the Guayule Rubber Plant, a native of Mexico is of bushy habit and slow growth and unlike other rubber producers the rubber is extracted by mechanical methods. Much has been done during recent years by American scientists in the way of seed selection and hybridisation to select the best producers for cultivation and immense sums of money have been expended in perfecting machinery for handling the plants and extracting the rubber. The industry has been seriously handicapped from its infancy owing to revolutions in Mexico and now that the price of rubber has dropped to such a low figure the prospects of the industry are not encouraging. The American Consul at Torreon, Coahuila, writing under date March 10th last (Commerce Report No. 15, p. 105), gives the following particulars—"Owing to the drop in the price of rubber, the Guayule rubber industry, formerly of considerable importance in the Torreon District, was of little consequence during the year 1921, all four rubber factories being closed and apparently abandoned, except the Continental-Mexican Rubber Co., the largest and most important, which owns a million-dollar plant and spent the year 1921 remodelling it and introducing a cheaper system of extracting rubber from the Guayule plant, which grows abundantly in the mountains of this district. On January 1st, this company again began operations and is still working full force, although, owing to the recent drop in the price of rubber, manufacturing is being carried on at a loss and will continue to operate about two months more, until the stock of Guayule plants on hand is used up. If, at the expiration of this period, the price fails to go up to 20 cents. or more, this plant will be forced to close down indefinitely. The three other plants, in Gomez Palacio, across the river from Torreon, are now closed and with present prices of rubber have no prospects of opening again unless the market for rubber soon changes for the better." Previous notes on Guayule have appeared in *K. B.* 1907, p. 285, 1908, p. 255, and 1910, p. 211.

J. M. H.